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Evaluation of coriander germplasm for yield and powdery mildew resistance

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Abstract

An experiment was conducted during *rabi* to identify coriander lines resistant to powdery mildew and high yield. Twelve entries were included for evaluation with one each of national check as well as local check. The result showed that out of 12, four lines were found susceptible to disease and remaining were moderately resistant. In the present study coriander line Cor-31 (DH220) produced the highest yield 1021.53 kg ha^{-1} with moderate resistant reaction against powdery mildew. The area under disease progress curve (AUDPC) and apparent rate of infection (r) values were 502.24 and 0.035, respectively.

Keywords: apparent rate of infection, coriander, *Coriandrum sativum*, powdery mildew, yield

Coriander (*Coriandrum sativum* L.) is a herbaceous plant extensively grown in India almost in all states as spice. The stem, leaves and seeds of this plant have pleasant aroma. Periodical evaluation of germplasm for high yield and disease resistance is important for any crop improvement programme. Coriander crop is affected by large number of diseases, out of which powdery mildew caused by *Erysiphe polygoni* DC. is one of the most important disease and has become a serious menace in recent past causing considerable yield loss. Hence, available germplasm was evaluated for yield and disease resistance.

Experiment was conducted during *rabi* for three years 2009–10 to 2011–12 at Regional Agricultural Research Station, Raigarh, Chhattisgarh (21° 20′ to 23° 13′ N latitude and 82° 55′ to 84° 20′ E longitude at an elevation of 237m MSL) with ten entries and one national check (*Hisar Anand*) and one local check (ICS-1). The minimum temperature falls 8°C during winter (December–January) and maximum temperature goes as high as 47°C to 49°C during summer (May–June). The average annual rainfall of the area is about 1200 mm, mainly received from South–West monsoon, mostly concentrated during the month of July to September. The experimental soil had 0.60% organic carbon, 185.4 kg ha^{-1} available N, 8.4 kg ha^{-1} available P, 216.6 kg ha^{-1} available K, soil pH 6.8 with sandy loam texture. The size of the plot was 4.0 m × 2.4 m and a plant spacing of 30 cm × 10 cm (row to row and plant to plant) was laid out in Randomized Block Design (RBD) with three replications. The fertilizer dose of 80 : 60: 40 kg NPK ha^{-1} was applied as per recommendation of AICRP on Spices. All

the recommended package of practices were adopted for raising the crop except disease management practice. The scoring for disease was done 0.0-4.0 Scale; 0.0= Healthy (no disease highly resistant HR), 1.0= whitish small spots on the leaf (up to 10% resistant R), 2.0= whitish growth covering the entire leaf (10-25% moderately resistant MR), 3.0=growth on leaf and stem (25-50% susceptible S) and 4.0= growth on leaf, stem and umbel (more than 50% highly susceptible HS) (Anon. 2004). The area under disease progress curve (AUDPC) was worked out as suggested by Wilcoxson *et al.* (1975) and apparent rate of infection (r) were calculated as per Vanderplank (1963) to find out the slow and fast spread of powdery mildew. The disease data taken for AUDPC are apparent rate of infection and scoring of the disease as first appearance of the powdery mildew and at weekly intervals up to 25 days before harvesting on 20 tagged plants in each treatment and replication. The yield data was taken at the time of harvesting and converted to yield ha^{-1}. The AUDPC value were calculated as per the formula given below:

$$AUDPC = \sum_{i-1}^{k} 1/2\,(Y_i + Y_{i-1}) \times D_{i-1}$$

Where, Y_i =disease incidence at i^{th} day of evaluation; D =interval between i and i-1 evaluation of disease; k =Number of successive evaluation; Apparent rate of infection as $r = 2.3/(t_2-t_1)[\log x_2/1-x_2 - \log x_1/1-x_1]$.

Where, 1-x =correction factor as changing quantum of available host tissue; t_1 and t_2 =two times intervals.

Out of 12 germplasm tested, four were found to be susceptible and remaining were moderately resistant. Three years pooled data showed the highest yield was obtained by Cor-31 (DH220) (1021.53 kg ha^{-1}) followed by Cor-32 (DH-233) (804.63) (Table 1) and showed moderately resistant reaction to powdery mildew disease (Table 2). The value of AUDPC and apparent rate of infection (r) for Cor-31 were 502.24 and 0.035 respectively. The values of AUDPC and apparent rate of infection (r) of susceptible varieties were more compared to moderately susceptible varieties. The value of AUDPC and apparent rate of infection showed the intensity of powdery mildew infection in coriander and its effect on yield. Similar results were also reported in wheat (Gupta *et al.* 1990) and pea (Kapoor 1990; Kapoor & Kumar 1996). The area under disease progress curve and apparent rate of infection are promising tools

Table 1. Screening of coriander germplasm lines for yield

Entry	Decode	Seed Yield (kg ha^{-1})			
		2009–10	2010–11	2011–12	Pooled
Cor-25	RKD-13	251.04	361.11	357.64	323.26
Cor-26	RKD-18	167.01	517.36	320.14	334.84
Cor-27	UD-475	362.50	372.22	320.14	351.62
Cor-28	UD-801	872.57	314.24	224.31	470.37
Cor-29	LCC-236	471.88	217.01	326.04	338.31
Cor-30	LCC-237	401.04	451.39	242.71	365.05
Cor-31	DH-220	950.35	1267.36	846.88	1021.53
Cor-32	DH-233	865.63	913.19	635.07	804.63
Cor-33	NDCor-30	536.11	636.81	458.33	543.75
Cor-34	NDCor-49	445.49	548.61	369.10	454.40
National Check	*Hisar Anand*	775.35	562.50	347.57	561.81
Local Check	ICS-1	784.72	850.69	607.29	747.57
CD (P<0.05)	-	11.33	74.227	50.08	63.54

Table 2. Screening of coriander germplasm for powdery mildew

Entry	Decode	Reaction against powdery mildew	Apparent rate of infection(r)	Area under disease progress curve (AUDPC)
Cor-25	RKD-13	S	0.089	785.5
Cor-26	RKD-18	S	0.078	797.4
Cor-27	UD-475	S	0.092	790.3
Cor-28	UD-801	MR	0.048	504.25
Cor-29	LCC-236	MR	0.048	529.4
Cor-30	LCC-237	S	0.079	779.2
Cor-31	DH-220	MR	0.035	502.4
Cor-32	DH-233	MR	0.047	507.4
Cor-33	NDCor-30	MR	0.052	508.4
Cor-34	NDCor-49	MR	0.049	506.5
National Check	*Hisar Anand*	MR	0.050	503.5
Local Check	ICS-1	MR	0.049	504.32

S=Susceptible; MR=Moderately resistant

to identify coriander for disease resistance and better yield. Our study indicated that Cor-31 is a better coriander line with moderate resistance to powdery mildew and high yield.

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